

TWO NEW SPECIES RELATED TO CLARKIA UNGUICULATA

FRANK C. VASEK

Clarkia unguiculata is common and widespread in the coast ranges and Sierra Nevada foothills of California. It is morphologically quite variable with regard to leaf size and shape, bud shape, sepal color, petal shape, size, and color, and pubescence type (Lewis and Lewis, 1955). A portion of this variation has been resolved as a closely related species, *C. exilis* (Lewis and Vasek, 1954; Vasek, 1958; 1960). The latter occurs in the low elevation foothill woodland of the southern Sierra Nevada of Kern and Tulare counties and is distinguished from *C. unguiculata* by its more slender habit, narrower leaves, smaller flowers, by the position of the stigma near the anthers which facilitates self-pollination, by its more rapid development, and by the absence of long hairs on the ovary and calyx.

Plants from the inner coast ranges of Alameda, San Benito, and western Fresno counties have been included in *C. unguiculata* but were noted to have leaves consistently narrower than usual (Lewis and Lewis, 1955). The same plants also lack long hairs on the ovary and calyx (e.g. Corral Hollow, *Eastwood & Howell 5291*, POM), and appear to have flowers somewhat smaller than usual. All of these characteristics suggest a morphological similarity to *C. exilis*. Consequently, an investigation was initiated to determine the relationships of the inner coast range plants with *C. unguiculata* and *C. exilis*. Plants from a population near Springville in Tulare County were included in the investigation because of their somewhat narrow leaves and their lack of long hairs on the ovary and calyx.

This investigation led to the conclusion that four distinct, morphologically recognizable entities occur, each differentiated from the others by extensive chromosome repatterning, hybrid sterility, and in the case of sympatric distributions, by reduced crossability (Vasek, 1964). All four species are morphologically similar and closely related. In all probability, *C. exilis*, *C. tembloriensis*, and *C. springvillensis* have each evolved independently from *C. unguiculata*. The details of the relationships, and a distribution map, are published elsewhere (Vasek, 1964).

I am grateful to Harlan Lewis for criticizing the manuscript and to Douglass S. Parker for assistance with the Latin diagnoses.

All four species are endemic to California and may be identified with the aid of the following key.

- Some long hairs present on the ovary and calyx; leaf width $\frac{1}{4}$ to $\frac{2}{3}$ the length; petal width $\frac{1}{3}$ to $\frac{3}{4}$ the length; leafy bract width, $\frac{1}{3}$ to $\frac{2}{3}$ the length; style usually well exerted; widespread in Coast Ranges and Sierra Nevada foothills from Lake and Plumas counties to San Diego County; usually in oak woodland *C. unguiculata*
- Long hairs absent; leaf width less than $\frac{1}{3}$ the length; petal width usually less than $\frac{1}{2}$ the length; leafy bract width usually less than $\frac{1}{4}$ the length.

Style usually well exerted; sepals dark red-purple; petals usually with a large, dark, red-purple spot at the base of the blade; often with 5 or 6 flowers open on one stem at the same time; near Springville, Tulare County; in foothill woodland*C. springvillensis*

Style seldom well exerted; sepals mostly green or only slightly reddish; petal spot, if present, small and well defined or if large, not sharply defined; usually only 1-3 flowers open on one stem at the same time.

Style equalling or only slightly exceeding the anthers; leaves usually bright green; petals pink, with or without a small purple spot at the base of blade, or white; Sierra Nevada foothills, southern Tulare and northern Kern counties, in or at the low elevation margin of foothill woodland.....*C. exilis*

Style equalling the anthers to well exerted; leaves usually gray-green; petals pink, sometimes with a darker blotch at the base of the blade, the claw often shorter but sometimes longer than the blade; or petals reduced, sepal-like, unexpanded and wrinkled, the claw very short, scarcely distinguishable from the blade which may be only 1-2 mm wide; arid inner coast ranges from eastern Alameda and western San Joaquin counties to western Kern and eastern San Luis Obispo counties; usually with *Haplophappus linearifolius*, sometimes at the valley grassland margin and sometimes with *Juni-perus californica* or at the dry margin of foothill woodland....*C. tembloriensis*

Clarkia springvillensis Vasek, sp. nov. Herba erecta, altitudine ad 1 m; caulibus simplicibus vel ramosis, glabris et glaucis; foliis 2-9 cm longis, 5-20 mm latis; calycis tubo 3-4 mm; calycis limbo 12-16 mm longo, 3-4 mm lato, rubido, puberulento; petalis unguiculatis, 13-16 mm longis; petali unguiculo gracili, 7-9 mm longo; petali limbo 6-8 mm longo, 7-10 mm lato, roseo, in basi saepe macula roseo-purpurea; ovario 10-17 mm longo; stylo 14-20 mm longo, quam staminibus longiore.

An erect herb to 1 m tall; stems simple or usually branched, glabrous and glaucous; leaf blades 2-9 cm long, 5-20 mm broad; hypanthium 3-4 mm; sepals 12-16 mm long, 3-4 mm wide, puberulent, usually dark red; petals 13-16 mm long, including a narrow red claw 7-9 mm long and a limb 6-8 mm long, 7-10 mm broad, lavender-pink usually with a dark purplish spot at the base of the limb; stamens 8, filaments red; ovary 10-17 mm long; style 14-20 mm long; exceeding the stamens.

The description is based on flowers from eight plants collected at the type locality in 1958, preserved in alcohol, and measured in the laboratory. The gametic chromosome number is $n = 9$ (Vasek, 1960; 1964). The plants usually bloom in May.

Type: Tulare Co.: Balch Park Road, 1.8 mi N of Springville Ranger Station, *Vasek 630522-1A*, May 22, 1963 (LA). Topotypes: *Vasek 630522-1B* (LA), *Vasek 630522-1C* (UCR = University of California, Riverside), *Vasek 630522-1D* (DS), *Vasek 630522-1E* (DS), *Vasek 630522-1F* (RSA), *Vasek 630522-1G* (LA), *Vasek 630522-1H* (UC), *Vasek 630522-1I* (RSA), *Vasek 630522-1J* (RSA), *Vasek 630522-1K* (UCR), *Vasek 630522-1L* (UC), *Vasek 630509-1* (UCR).

Specimens examined. Tulare Co.: above Springville, *H. & M. Dearing 2666* (SBBG); N of Springville, *Purpus 1319* (UC).

Clarkia tembloriensis Vasek, sp. nov. Herba erecta, altitudine ad 8 dm; caulibus simplicibus vel ramosis, glabris et glaucis; foliis 2-7 cm

longis, 3–13 mm latis, glaucis; hypanthio 2 (3) mm longo; calycis limbo 9–16 mm longo, 2–3 mm lato, puberulento; petalis expansis, unguiculatis, 13–17 mm longis, unguiculo gracili, 5–11 mm longo, limbo 5–9 mm longo et 4–9 mm lato; vel petalis non expansis, 7–14 mm longis, unguiculo et limbo (1) 2 mm lato: stylo 9–18 mm longo, quam staminibus longiore vel longitudine aequa.

An erect herb to 8 dm tall; stems simple or sometimes branched, glabrous, glaucous; leaf blades gray-green, 2–7 cm long, 3–13 mm wide; hypanthium 2(3) mm long; sepals 9–16 mm long, 2–3 mm wide, puberulent; petals expanded 13–17 mm long, including a narrow claw 5–11 mm long and a limb 5–9 mm long; 4–9 mm wide; or petals not expanded, 7–14 mm long, (1) 2 mm wide, with the limb scarcely wider than the claw; style 9–18 mm long, exceeding, or usually not exceeding the stamens.

The description is based on 39 plants from three sites in Carneros Canyon and nine plants from scattered localities as far north as Panoche road. Flowers and bracts of wild plants were preserved in alcohol, then dissected and measured in the laboratory. The gametic chromosome number is $n = 9$ (Vasek, 1964). The plants bloom in April and May.

Type: Kern Co.: Carneros Rock, Temblor Range, *Lewis 1028*, April 15, 1956 (LA).

Specimens examined. Alameda Co.: Corral Hollow, *Eastwood & Howell 5291* (POM). Fresno Co.: N of Coalinga, *H. & M. Lewis 911* (LA, RSA); Alcalde, *Eastwood 13566* (CAS); 4.1 mi W of Coalinga, *Vasek 620505-5* (UCR); 8.7 mi W of Coalinga, *Vasek 62505-6* (UCR); Panoche Road, 9.7 mi W of P. G. & E. Panoche Substation, *Vasek 620505-3* (UCR); Diablo Range, Cantua Creek Road, near State Highway 33, *Vasek 620505-1* (UCR); *Vasek 620505-2* (UCR). Kern Co.: Hodges Canyon, 1.7 mi S of United States Highway 466, *Vasek 620425-3* (UCR); Cedar Canyon, Alec Cook Canyon, *Twisselman 1189* (CAS). Kings Co.: Kettleman Hills near Arenal, *Hoover 3301* (RSA, UC). San Benito Co.: 6.3 mi S of Panoche, *McKaskill 440* (DAV); Idria Road, 4.6 mi S of Panoche Road, *Hesse s. n.* (UC); Call Mounties, 18 mi N of New Idria, *Raven 10866* (RSA); 4 mi S of Paicines, *Constance & Morrison 2267* (POM). San Joaquin Co.: Coral Hollow, *Arnold s. n.* (CAS); near Corral Hollow, *Hoover 3358* (RSA). San Luis Obispo Co.: Red Hills, Kelly's Canyon, *Twisselman 2855* (CAS); 2 mi NE of Cholame, *MacMillan 150* (LA); Caliente Range, 8.1 mi S of Simmler, *Vasek 620502-1* (UCR). Stanislaus Co.: Mount Hamilton Range, Arroyo del Puerto, *Sharsmith 1753* (DS).

University of California, Riverside

LITERATURE CITED

- LEWIS, H. and MARGARET E. LEWIS. 1955. The genus *Clarkia*. Univ. Calif. Publ. Bot. 20:241–342.
- LEWIS, H. and F. C. VASEK. 1954. *Clarkia exilis*, a new Californian species. *Madroño* 12:211–213.
- VASEK, F. C. 1958. The relationship of *Clarkia exilis* to *Clarkia unguiculata*. *Amer. Jour. Bot.* 45:150–162.
- . 1960. A cytogenetic study of *Clarkia exilis*. *Evolution* 14:88–97.
- . 1964. The evolution of *Clarkia unguiculata* derivatives adapted to relatively xeric environments. *Evolution* 18:26–42.